U.S. Military Academy - Queensboro Furnace
Junction of Queensboro and Popolopen Creeks,
2 1/2 miles west-southwest of Fort Montgomery
U.S. Military Academy
West Point
Orange County
New York

HABS No. NY-5708-57

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Buildings Survey
National Park Service
Department of the Interior
Washington, DC 20013-7127

HABS No. NY-5708-57
U.S.M.A. No. 1980

HISTORIC AMERICAN BUILDINGS SURVEY
U.S. MILITARY ACADEMY - QUEENSBORO FURNACE

LOCATION: Junction of Queensboro and Popolopen Creeks, 2½ miles west-southwest of Fort Montgomery, Orange County, New York.

U.S.G.S.

PRESENT OWNER AND OCCUPANT: U.S. Military Academy, Department of the Army.

PRESENT USE: Historical monument to the early iron smelting industry.

SIGNIFICANCE: The Queensboro Furnace is not only one of the few surviving eighteenth-century structures on U.S.M.A. property but also a rare early vernacular industrial structure representing a regional type of iron-smelting furnace.

PART I. HISTORICAL INFORMATION

A. Physical History:

1. Date of erection: ca. 1783-1789 (Ransom).

2. Architect: Unknown.

3. Original and subsequent owners: The Furnace and surrounding property have been owned by the U.S. Military Academy since 1942.

4. Builder: Unknown.

5. Original plans and construction: Based on the surviving structure, its siting, and on typical furnace construction, it can be assumed that the smaller arched opening on the west elevation is the bellows arch and the larger arched opening on south is the casting arch. This arrangement of openings is similar to that seen in a photograph of the Freedom Furnace (Ransom, 5). A modern spillway across Popolopen Creek just to the west of the Furnace most likely occupies the site of an eighteenth-century dam. This dam would have been needed to supply water, via a sluiceway, to an overshot waterwheel, probably located to the southwest of the Furnace. Extending north from the waterwheel, a log camshaft would have

operated one-to-two bellows set perpendicularly into the bellows arch. If the typical furnace construction scheme as shown in Ransom is followed, the Queensboro Furnace would have had an inwall lining, a bosh, a crucible area, a hearth, and a damstone (illustration in Ransom, see Supplemental Material). The elevated roadway north of the Furnace suggests that the charging bridge was located on that side, providing easy access for the delivery of coal to the furnace throat.

An 1885 description of the Furnace by Kirk Monroe is given in Ransom:

> 'It stands in an open field by the roadside and is about thirty feet high, its grey walls are mantled with ivy and from its crumbling crest springs a clump of good sized trees. Its arched entrance and interior dome are clean-cut and unbroken as when the builders left them and are beautiful specimens of the stonemason's art. It is known as the old furnace 'par excellence,' and is said to have been erected under the personal supervision of Kosciusko, the gallant Pole.' (Ransom, 160)

6. Alterations: The Queensboro Furnace was "put out of blast" in 1800. It was probably at that time that its mechanical parts were removed. The 1885 description quoted above indicates that the crucible area was gone by that date and the references to "clean-cut and unbroken" interior walls might indicate the loss of an inwall lining, if indeed one was present.

   Ransom notes that the Furnace was "restored" by the U.S. Government in 1912; this most likely consisted of restoring stones and the selective use of mortar. An iron stablizing bar was also stretched across the upper part of the casting arch.

B. Historical Context: The early history of the Queensboro Furnace is only partially known and somewhat confusing. Ransom attributes much of this confusion to the fact that the Queensboro Furnace and the nearby Forest of Dean Furnace were both referred to as the Orange Furnace. Based on a property description in 1775 (Ransom) and maps of the period, Ransom believes that only the Forest of Dean Furnace pre-dates the Revolution. A description of the area by Hector St. John de Creveccoeur in 1789 does establish the Queensboro Furnace by that date. The plaque mounted on the north elevation of the Furnace, which cites an event associated with the Furnace in 1777, would seemingly then be in error.

   By 1775 the tract of land on which the Furnace was built was known as "Queensberry" and contained a sawmill, three houses, two landing places and a wagon road to "Queensberry," presumably a settlement of some sort. An advertisement in the New York Spectator in 1799 mentioned that the

"Queensboro Iron Works" was for sale and included the 1,437 acre Queensboro tract and the 6,600 acre Dean tract. The advertisement mentioned a furnace (Queensboro), forge, coal houses, carpenter and blacksmith shops, a manager's house, frame and log workmens' houses, a sawmill and a farm. It is thought that by this date the Forest of Dean mine was supplying iron ore only for the Queensboro Furnace, which it is estimated produced about a ton of iron pigs per day.

The Furnace was shut-down in 1800 and sold again in 1810 even though a forge mentioned at "Queensboro" in 1838 was apparently still operating. The power afforded by Popolopen and other local creeks continued to be exploited but early nineteenth-century descriptions indicate that the local industry had changed from furnaces and forges to that of sawmills and gristmills.

Ransom's Vanishing Ironworks of the Ramapos should be consulted for more details related to the above history.

PART II. ARCHITECTURAL INFORMATION

A. General Statement:

1. Architectural character: The Queensboro Furnace is a regional vernacular structure constructed of local materials in a purely functional form. It was oriented on its site to take advantage of hydropower, transportation routes and the source for raw material.

2. Condition of fabric: Although overgrown with vegetation, that is potentially harmful to its fabric, the stone of the Furnace and the basic form of the exterior and interior are in fair condition.

B. Description of Exterior:

1. Overall dimensions: The Furnace is basically square in plan, measuring 26' 9" (south) x 28' 7" (west). Besides the top throat opening, the only openings are a casting arch on the principal south elevation and a bellows arch on the west elevation.

2. Walls: Conforming to regional prototypes, the Furnace is constructed of rock-faced stone laid in a dry, random range ashlar pattern and resembles a step-back, truncated pyramid. The walls step-back about 1' on all sides and at two levels. On the north elevation a metal plaque is set into concrete (see Historical Context).

3. Openings: A casting arch on the south elevation measures 13' 9" at grade and rises to a steep pointed arch that culminates at the second set-back level. This arched opening tapers inward so that it measures 6' 0" in width halfway to the interior chamber. The opening extends back to the interior 9' 6". On the west a smaller opening, the bellows arch, measures 9' 7" at grade and rises to a steep point at the first set-back level. Both openings were skillfully formed, without the benefit of voussoirs, in a cantilevered fashion.

4. Roof: The flat-topped Furnace has a small central opening or throat open to the interior.

C. Description of Interior: While the Furnace has been stabilized structurally, the interior is completely open with no indication of its original function besides representing the basic volume. The interior is now a 9' 0" square space at the dirt floor level that narrows upward in a round form to the throat or opening in the roof.

D. Site: Because of the need for a power source, the Queensboro Furnace was located just to the north of Popolopen Creek and up against, but below, a roadway about 50 yards north of the creek. The creek provided power via a waterwheel while the roadway provided access to the top of the furnace for fuel. The dirt roadway is secondary with a spur that drops down between the creek and the Furnace. Across the road just north of the Furnace is a frame house.

PART III. SOURCES OF INFORMATION

A. Early Views: Ransom reproduces both a 1921 photograph of the Furnace by Vernon Royle and an 1884 sketch from the Outing and the Wheelman. No other early views of the Furnace are known.

B. Bibliography:

1. Secondary Sources:

Lange, Robie S., "West Point: An Overview of the History and Physical Development of the United States Military Academy. Historic American Buildings Survey, 1983. HABS No. NY-5708.

Ransom, James M. Vanishing Ironworks of the Ramapos. New Brunswick: Rutgers University Press, 1966.

C. Likely Sources not yet Investigated: Local histories and historical societies have not been investigated and might yield more on local historical context. Similarly, secondary works on early iron smelting might provide comparative information with which to analyze the structure of the Furnace.

D. Supplemental Material:

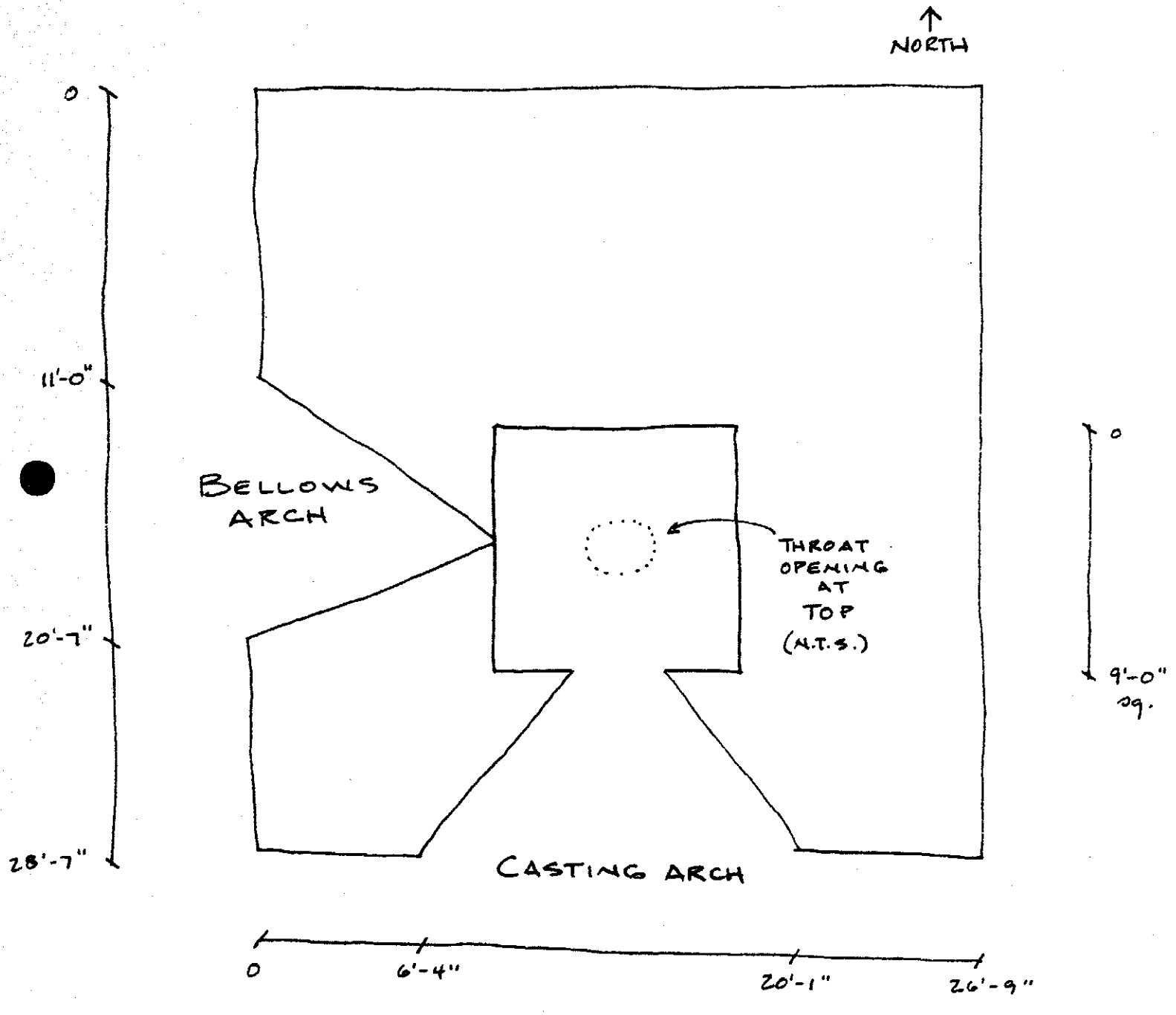
1. Scaled plan.

2. Unscaled site plan.

3. Selected parts of Ransom's Vanishing Ironworks.

D. Supplemental Material

2. Queensboro Furnace, Scaled Plan.



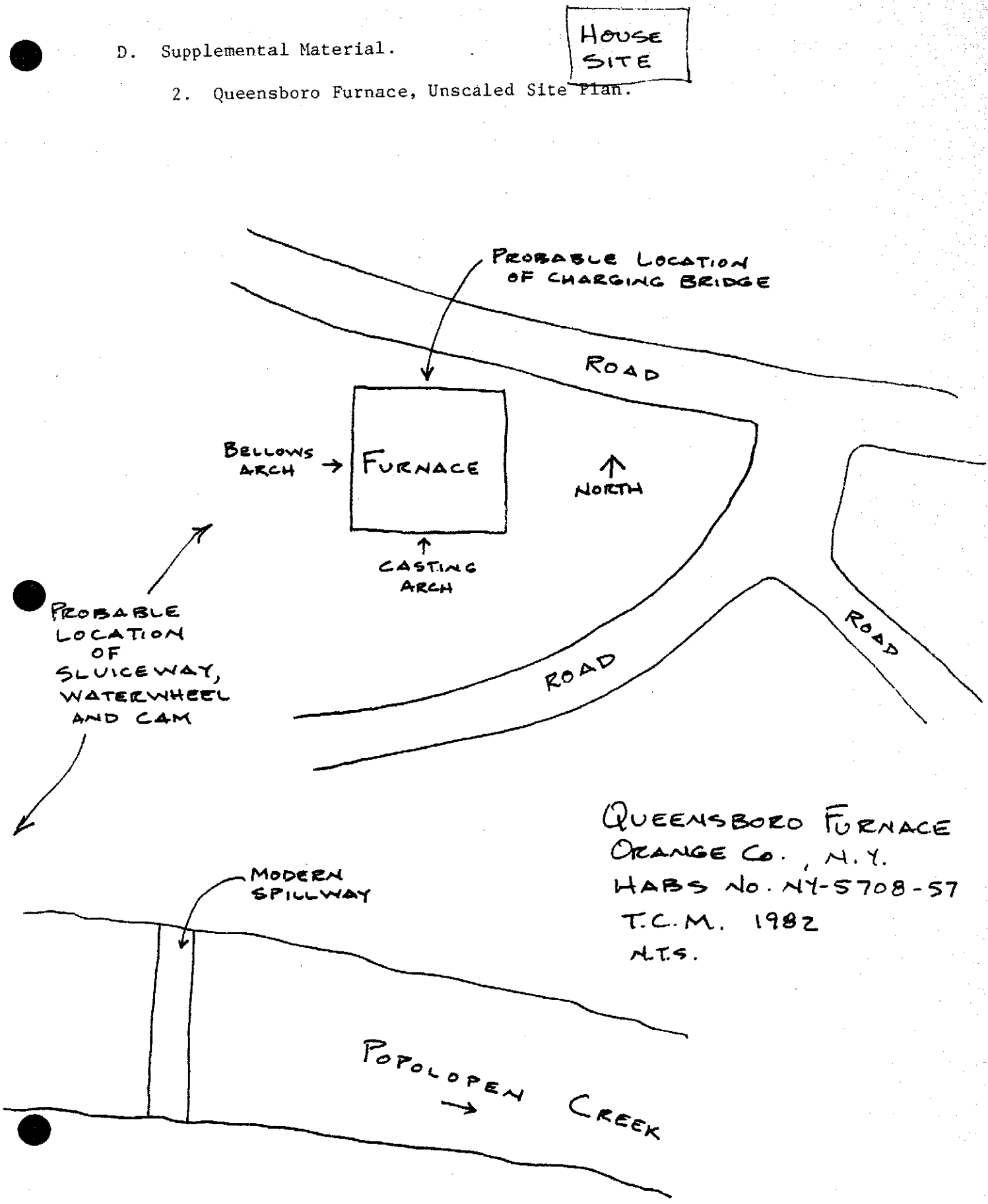
PLAN
QUEENSBORO FURNACE
ORANGE CO., N.Y.
T.C.M. 1982

SCALE 1'-0" = 3/16"

0 1 2 3 4 5

D. Supplemental Material.

2. Queensboro Furnace, Unscaled Site Plan.



D. Supplemental Material

3. Ransom, Vanishing Ironworks.

VANISHING IRONWORKS of the RAMAPOS

The Story of the Forges, Furnaces, and Mines of the New Jersey — New York Border Area

By JAMES M. RANSOM

RUTGERS UNIVERSITY PRESS
New Brunswick 1966 *New Jersey*

Southfield Ironworks, 1835. Detail from an oil painting by Raphael Hoyle. Owned by the author. *Photo by Frank Moratz.*

INTRODUCTION

Iron and the Ramapos

Centuries ago the Lenni Lenape Indians who lived on each side of the New Jersey-New York border gave a name to their hills which sounded like "Ramapo," but began with an "L." The Lenapé language contained no "r" and the change was the white man's. Today the hills are known locally as the Ramapo "Mountains" in Orange and Rockland Counties in New York, and Passaic and Bergen Counties in New Jersey.

The Indian name was descriptive and identifying. In their language it meant "place of the slanting rock." The first white men to explore the region must have observed that the layers of rock which formed the mountains sloped, but if they did not at once observe a more important fact about them, those who came later did. To their knowledgeable eyes the gray outcroppings, with streaks of darker gray and black, indicated the presence of iron ore. It was a recognition of significant consequence.

Until the outset of the eighteenth century, most of the iron the European settlers in America were using came from across the Atlantic, largely from Britain. Its cost was high for many reasons besides the obvious one of transoceanic shipping. The mines of the Old World were old mines, and the costs of working them were high and going higher. The charcoal fuel required for smelting was becoming exorbitant.

Here in the Ramapos was part of the answer to the cost of overseas iron. This New World iron deposit consisted largely of what geologists call magnetite, a form of iron oxide with the highest known iron content; it could be smelted by familiar techniques and

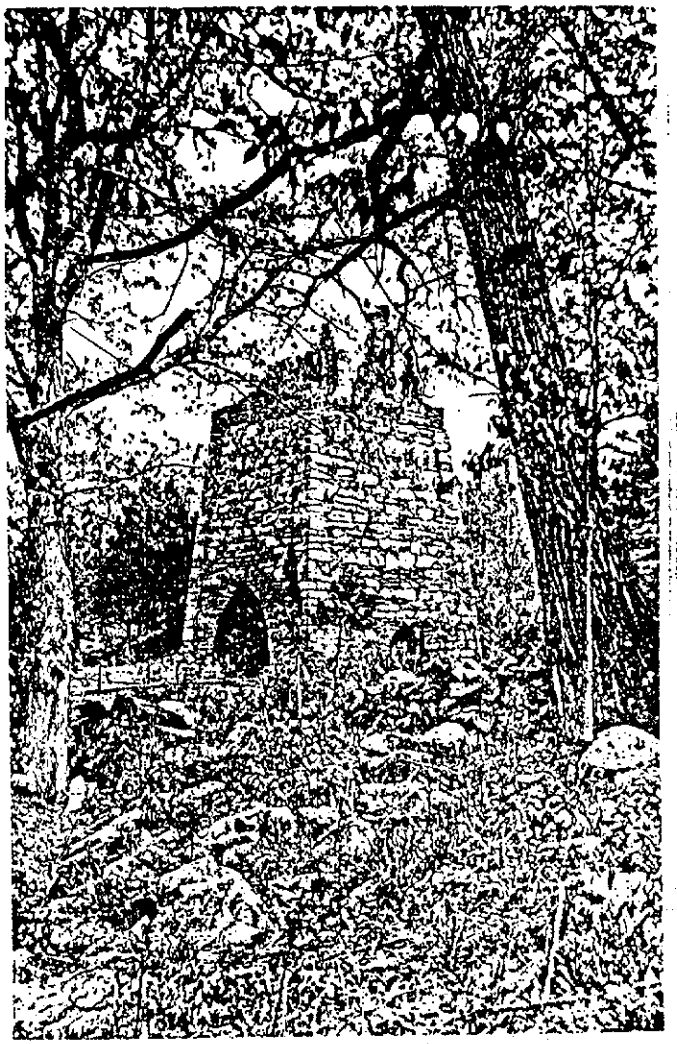
the necessary fuel was close at hand. The ore also contained a second sort of iron compound, hematite, more difficult to smelt and largely lost in the early refining process.

The Ramapos provided several natural advantages. The region is largely bounded by three small rivers: the Ramapo River along the southeast border of the area, the Ringwood, rising in Sterling Lake and winding southward, and the Pequannock, which rises in the eastern part of what is today Sussex County, New Jersey, and flows east-southeast into the Ramapo near Pompton Plains. Above the stream beds, the layers of ore deposit cropped out among hills thick with trees which would supply fuel for conversion into charcoal for many years to come.

The rivers, and the rains that had fed them over countless centuries, had performed another service. The rock formations which contained the ore beds had been laid down over a billion years earlier, in the epoch the geologists have named the Proterozoic. After a vast and complex series of changes, the ancient beds of ore emerged above the surface of the ocean comparatively recently, as geologists reckon time. Then the waters had gone to work, stripping away overlying deposits and carving valleys and ravines, so bringing the ancient rocks to the surface, to be seen and eventually to be mined without the necessity for difficult and costly deep working. Streams and rivers were still flowing when the white men came, as they are today, and they provided an essential for an industry of Colonial iron—adequate water power in a period which was still without the power of steam.

There was even more: the flowing waters, as they moved toward the sea, produced a final favorable element in the topography of the Ramapo region. The rivers cut into the terrain deeply, making easy gradients for the early roads. Here was a factor of special importance to an age which preceded the railroad and the canal. The ox or mule-carts of transport did not have to travel costly distances. No part of New Jersey is very far from water deep enough for shipping either light or heavy cargoes. And the water routes, in turn, led eventually to the ports and roads of all the other Colonies.

New Jersey was not the only iron producer in the New World: the same year the Pilgrims landed at Plymouth Rock a forge had been built near Jamestown; by the end of the s[illegible]teenth century Massachusetts had become the chief seat of the [illegible]l iron industry



Freedom Furnace. *Photo by Vernon R[illegible] 1903.*

in America; and the eighteenth century saw the rapid rise of a widespread Colonial iron industry. Furnaces and forges were in operation up and down the Atlantic coast, in every Colony except Georgia, and the industry was spreading inland and westward with the frontier. Export of American iron began as early as 1718. In bars and pigs the iron was moving eastward across the ocean to Europe in ever-increasing tonnages; exports to England in 1771 were between 7,000 and 8,000 tons. By the time the Revolution broke out these Colonial furnaces were producing about 14 percent of the world's supply of iron. The Colonies were indeed producing more iron than the combined output of England and Wales.

New Jersey's major asset in the iron industry was its central location. Within the Colony itself, furthermore, there were two separate regions where furnaces could be built and not all of the iron ore lay in the northern hills. A hundred or more miles to the south, in a thinly settled area of swamps and stunted pines, there were ochre-colored deposits of another ore of iron, limonite, which the producers of bog iron had worked briefly. However, there were fewer than ten furnaces operating in South Jersey before the Revolution.

North or south, Jersey iron was easy to get at. The southern bog iron ore was to be found in surface-level deposits, and in the northern part of the state the ore-bearing strata occurred as outcroppings. In the eighteenth century, shaft mining was almost never practiced in the Colonies, including New Jersey; pickaxes and crowbars were the basic tools and manpower was therefore relatively efficient and economically practical. The eve of the Revolution found the Colonies well able to furnish their own most basic sinew of war, iron for tools, for guns, for cannon and for shot—iron enough, indeed, to forge gigantic chains to stretch across the Hudson and interdict the river to British men-of-war.

Along with the iron itself went the men who mined and smelted and wrought it. They were a special and hardy breed, and their descendants not only still bear their names but have spread into every state of the nation. What sort of men—and women—they were, where they came from, how they lived, and what became of them is a special chapter in the complex encyclopedia of American history. Their enterprises have marked the Jersey hills and changed the landscape of the state. Their story is part of [illegible] national heritage.

Furnace, Forge, and Fuel

At one time many active iron forges and furnaces were scattered throughout the Ramapo Mountains. Today a visitor to their deserted sites sees only crumbling ruins. It is difficult to reconstruct in imagination what these early ironworks looked like and how they produced the metal that Colonial farmers and Revolutionary soldiers depended upon for their very lives and livelihood. Yet, in the heyday of Ramapo iron, these almost forgotten furnaces were well-known, even famous. The men who built and owned them were often public leaders, and the miners, charcoal burners, ironsmiths, and craftsmen in metal who labored in the mines and at the hearths were independent, self-reliant citizens who took the hardships of their lives in stride.

It was an industry which demanded strenuous work, work of pioneer intensity, to mine the ore and smelt hard iron from it. Some of the story has been lost, and it is not always possible to say how accurate the existing information really is. But the documents and letters of the time do permit a reasonable reconstruction of what it was once like when furnace smokes were rising and trip-hammers banging away in the valleys of the hill country.

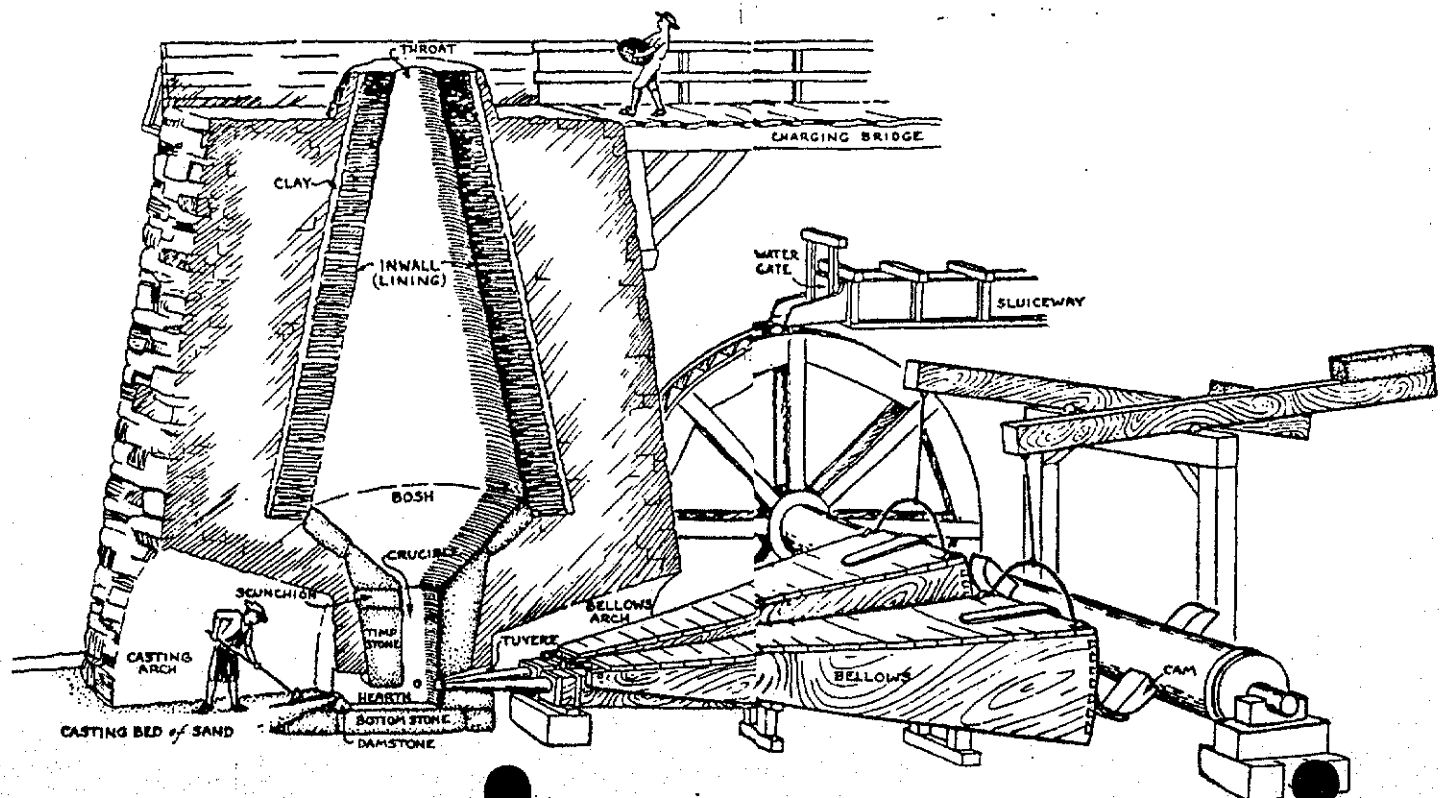
In those earlier days the terms forge and furnace were frequently used interchangeably; as a result, some confusion of facts as well as terms confronts anyone who investigates the story of Ramapo iron. The first smelting furnace erected in the area is believed to have been the one built by the Ogden family at Ringwood, New Jersey, in 1742. The earliest recorded forge for working iron (or "bloomery" as such forges were sometimes called) was one constructed at Pompton, New Jersey, prior to 1726. But the exact year it was built and the date when its actual operation began are unknown.

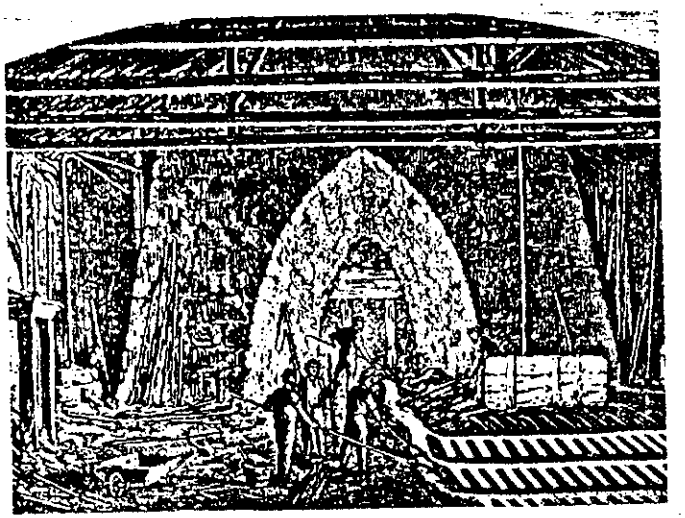
Furnaces can be described simply as truncated pyramids of stone and brick, and they were usually located at the foot of a hillside. From a point part way up the hillside, a bridge or loading platform was built across to the top of the furnace stack. Progressive layers of fuel, ore broken up into fist-sized chunks, and limestone for flux, were taken across the bridge by baskets or crude pushcarts and emptied down the open stack of the fu[illegible]e. This charging

was the first step in preparing a furnace for firing. By modern standards, these early iron-working furnaces, or forges, were unimpressive in size. The earlier furnaces, using charcoal as a fuel, were seldom more than 25 feet square at their bases and ranged from 22 to about 30 feet in height. The later furnaces, built during the 1840–60 period, used Pennsylvania anthracite and rose as high as 55 feet. They averaged some 35 feet across the square base.

The egg-shaped interiors of the earlier furnaces were lined with sandstone or slate against the intense heat generated when the

furnace was operating. The later ones employed firebrick. The blast, or forced stream of air which intensified combustion, was supplied by two or more large bellows, operated alternately by cams on revolving shafts, which in turn were powered by waterwheels. Many of these wheels were 15 feet or more in diameter, and an ample supply of water was needed to turn them. For this reason, furnaces were invariably located near good-sized streams or even rivers. Some of the early ironmakers constructed reservoirs upstream from their furnaces and forges to forestall lack of water during a pro-





Molten iron flowing from the furnace into the pig beds.

tracted dry season, and built wooden roofs to shelter the waterwheels from winter weather.

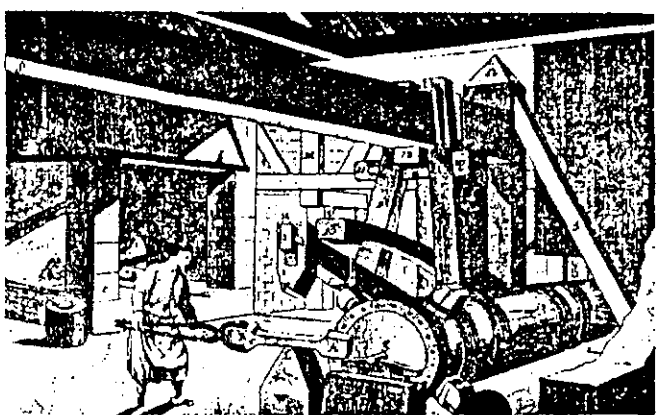
Once filled to its proper level, the furnace was ignited and the process of smelting the iron ore began. Intensified by the air blast, the heat of the layers of burning fuel gradually melted the ore. As the process progressed, the iron, denser and heavier than the ore, trickled to the bottom, or hearth, of the furnace. The residue, or slag, floated on top of the molten iron and was drawn off through an opening—the cinder notch—just above the damstone at the base of the furnace.

When the tapping hole in the casting arch was unstopped, the molten iron flowed forth. It ran into a trough and on into a channel (the sow) dug in the sand of the casting floor. From the sides of the sow a series of smaller troughs extended. The liquid iron flowed into these laterals as well. The pattern formed by the casting bed resembled the outline of a mother pig feeding her sucklings, and suggested the term commonly used by the ironmakers and the industry—"pigs"—to describe iron cast in this fashion. Sometimes additional channels ran from the sow into molds for firebacks or other cast iron products, but pigs were the principal output.

In addition to the casting arch, the early furnaces had another arch, on a second of its sides, to provide entry for the bellows blast which passed through tubes called tuyère (pronounced twee-air) pipes. Later furnaces had a third arch, also constructed to admit tuyère pipes. Still later, a fourth arch was added to provide blast from three sides. The arches generally approximated 12 feet in width and rose as much as 15 feet from the ground to their apexes.

After the iron pigs had cooled in the casting bed, they were taken to the forge. Here they were reheated to softness and shaped into lumpy masses which were then pounded by a massive water-driven trip-hammer to reduce the impurities in the iron. Next, the iron was reheated in the forge, brought back again for hammering, and finally shaped into bars or forms, called "anconies," resembling dumbbells.

An important part of early iron manufacture was the production of charcoal for fuel. At least until the beginning of the nineteenth century, and even for a short time thereafter, ironmasters relied on charcoal as the principal means of fueling their furnaces. Producing charcoal, like the rest of the process of iron-making, was a laborious task even though in the hilly country of the Ramapos wooded terrain was always relatively close at hand. Gangs of wood-



Shaping an ancony at the forge. Denis Diderot, *Encyclopédie*, 1765.

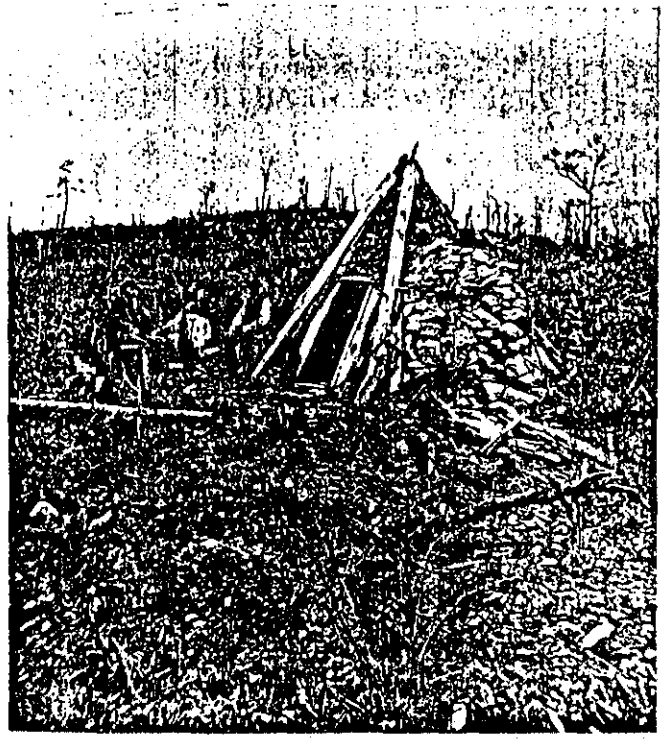
choppers first felled suitable trees and after the trees had been cut into proper lengths, trimmed the logs and carted them to a charcoal-burning area. Here they were stacked upright in a cone-shaped pile on dry, level, and sheltered ground—then covered by earth and damp leaves.

The blanketed cone of wood was set on fire by igniting chips and leaves and dropping them down the small flue or chimney left in the process of stacking the logs. Firings were usually carried on from early May until late in October, thus avoiding the problems of strong winter and spring winds, and other unfavorable weather conditions. Weather, indeed, dictated the entire cycle of charcoal burning. The trees themselves were cut down in the coldest months, after their sap had retreated to their roots. Wood cut in the winter months is harder and dries faster than at any other season of the year, and when burned, it produces stronger and more solid charcoal as the sap of deciduous trees, going down into the roots for winter, leaves behind in the fibers of trunk and branches a large proportion of the soluble chemicals.

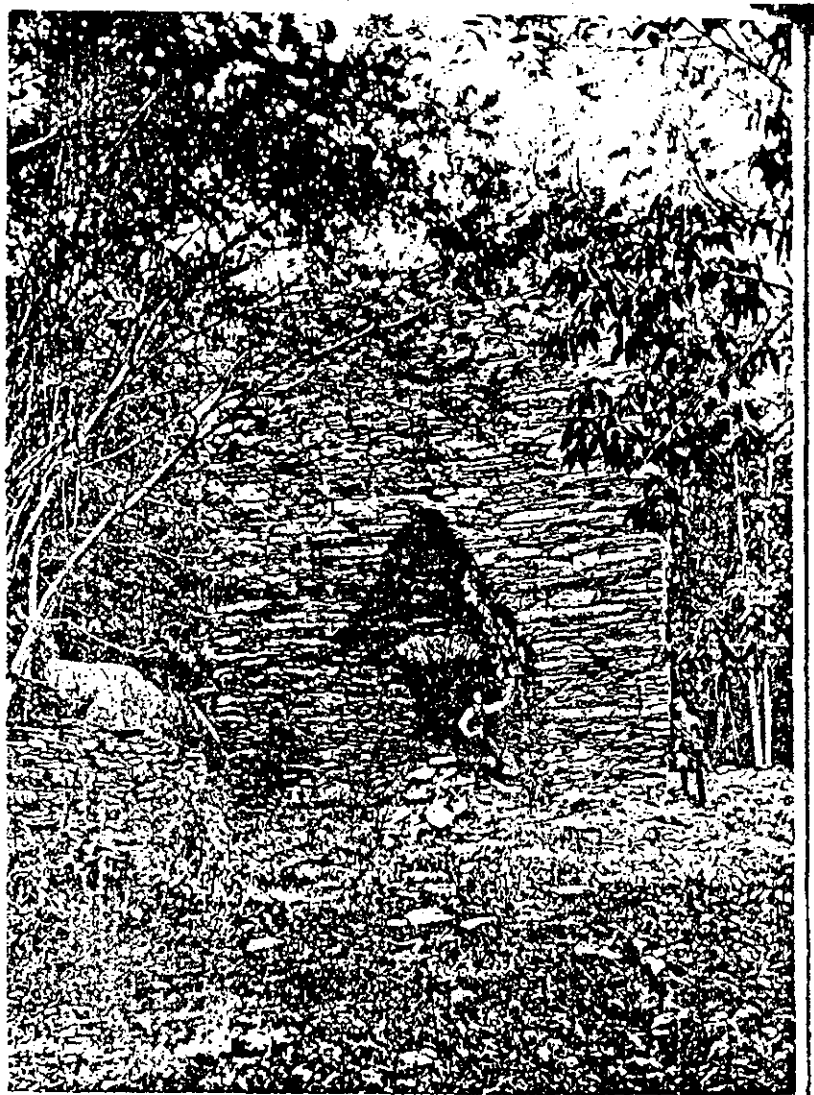
The firings called for skill and experience. Small openings had to be provided in the sides of the cone of wood to supplement the central flue in providing a proper draft, and had to be adjusted to changing winds. Since from three to ten days were required to char a large cone properly, depending partly on the weather and partly on the kind of wood being charred, the whole process called for constant and skilful surveillance, and burners often camped out in rough shelters near the smoldering cone to maintain a round-the-clock watch on the operation. The charcoal end-product of all their work and care was nearly pure carbon which, after cooling, was heaped in small piles and taken to the furnaces as it was needed.

Much more than just iron ore—furnaces, forges, charcoal, sandstone, limestone, and heavy labor—was necessary for the successful operation of an early ironworks. A whole catalog of supplementary goods and services was needed to provide and maintain the wide variety of tools, mauls, sledges, utensils, and other implements necessary to the process of iron-making itself, and to the human needs of the workers who manned the works and their families. Inevitably, communities grew up in the vicinities of the furnaces and forges. There were stores, offices, gristmills, blacksmith shops,

carpenter shops, homes, schools, churches, and eventually even railroads to provide transportation to and from the sites of the early ironworks. From the beginning, such enterprises demanded expert management and coordination, but occasionally administrators were not equal to the problems. At least once, an ironworks well-known in the Ramapos failed because of too ambitious an outlay of resources to meet the demands, social and technical, of the enterprise.



A charcoal burner's hut. Westbrook Valley, West Milford, New Jersey. *Photo by Vernon Royle, 1895.*



A rare old photo of the Noble Furnace, circa 1870, before the south side and arch caved in.

NOBLE FURNACE

William Noble of Bellvale, New York, acquired by patent from the State of New York on April 29, 1813, a strip of 870 acres along the west shore of Greenwood Lake. Here, about 150 yards inland, on a stream now called Furnace Brook, he built a furnace about 1833.

The furnace was a failure from the beginning, because the stream —only a few feet wide—could not supply sufficient waterpower for the blast. In 1939, John Townsend, with a remarkable memory at eighty-two, and a good knowledge of the area, told the author that the furnace was called the "Succor" or "Sucker" because everyone who invested in it lost his money.

One can still see the ruins of the furnace, its walls composed mainly of thin shale rock.[3] Consideration of the location on the small brook makes one wonder why such a site was chosen. The answer seems to be that the construction of a sizeable reservoir had been planned above the furnace. But the contour of the land on the side of the hill, and the size of the stream hardly warranted the effort, assuming the brook was as small in the early nineteenth century as it is today.

QUEENSBORO FURNACE

The restored ruins of this old furnace are still standing at the junction of the Queensboro and Popolopen Creeks, about two-and-a-half miles west-southwest of Fort Montgomery, New York.

The date of its erection is unknown. Most historians feel that Queensboro was active during the Revolution, but it seems unlikely that it was built before 1783. Two things have led to the confusion and mystery which surrounds the date. First, it was sometimes referred to as the Orange furnace, rather than by the correct name of the Queensboro; also the Forest of Dean furnace, just to the

The east side of the Noble Furnace, showing the deterioration of the south side. *Photo by Vernon Royle.* (See previous picture.)

north, was at times also called the Orange. This double identity has become a stumbling block for many researchers, since military correspondence in the early years of the war sometimes referred to the Orange furnace. However, this reference was to the Forest of Dean, in operation at that time, rather than the Queensboro.

The second reason responsible for the belief that the Queensboro furnace was standing in 1777, is a plaque on the north side of the furnace which reads:

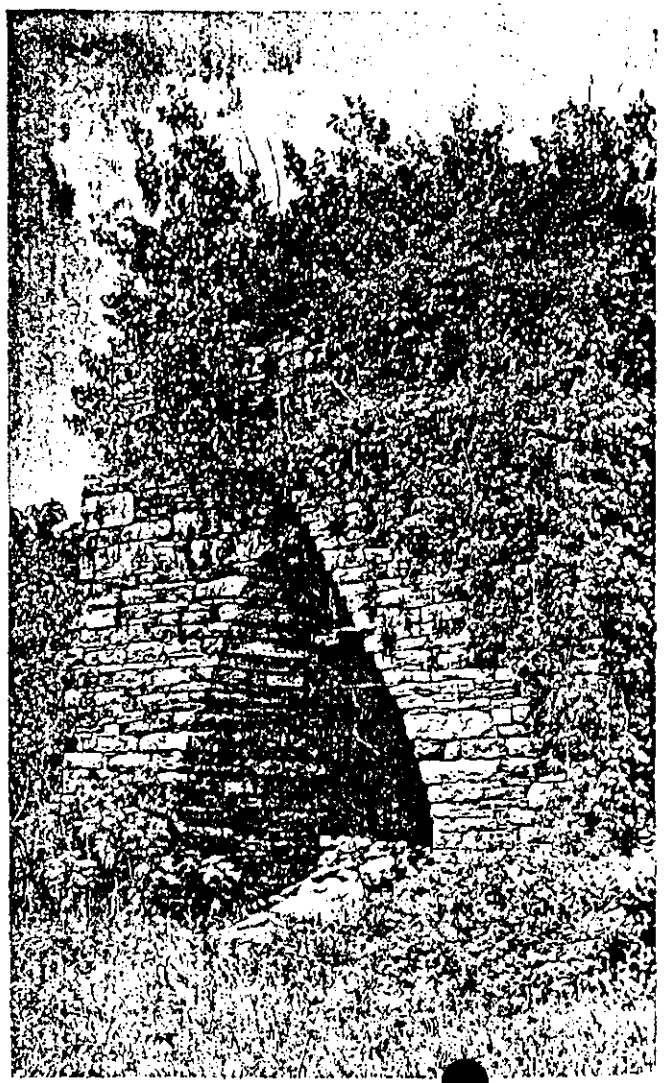
ORANGE OR QUEENSBORO FURNACE
Erected 17–
On the 6th of October 1777
A British Column of Nine Hundred Men
On their way from Stony Point
To Attack Fort Montgomery
Forded Popolopen Creek
At This Furnace

This tablet is misleading. No furnace is shown at the Queensboro site on any of the maps of the period, whereas the Forest of Dean furnace does appear on some of them, as well as in military correspondence.

Ownership of the property can be traced back to October 18, 1731, when the tract of 1,437 acres where the furnace now stands was granted to Gabriel and William Ludlow. On February 13, 1775 the following advertisement appeared in the *New-York Gazette and the Weekly Mercury:*

> To be sold, on the premises, the 25th of March next, at public vendue, if not before disposed of at private sale, A VERY VALUABLE TRACT OF LAND, situate in Orange County, about 50 miles from the City of New-York, and two miles and a half from Hudson's river on the westerly side thereof, containing about two thousand acres and known by the name of Queensberry . . .

This early advertisement also states that the tract was "uncommonly well watered" and "heavily timbered"; the only buildings on the property were a sawmill and three houses, one of them new; there were two landing places that could be used by the purchaser, one



Queensboro Furnace. *Photo by Vernon Boyle, 1921.*

being at "Poplope's Kill," which was also the landing place for the "Furnace of Dean," and the other on the west side of Salisbury Island where there is "a good waggon or cart road to Queensberry."

No mention is made in this advertisement of any ironworks here at that time, but the Forest of Dean furnace receives prominent mention in the latter part of the notice in this manner:

> . . . The above premises are in good repair and happily situated in a thick settled country, having the Furnace of Dean within two miles and a half of the principal dwelling-house, which will always provide a ready market for a great part of the produce of the farm, besides the convenience of a weekly conveyance to New-York during the season. For further particulars enquire of Mr. Robert Ross at the North-River in New-York, or of Moses Clement, Esq., on the premises.

The earliest mention of ironworks, which can be in any way construed as being on the Queensboro tract, is by Hector St. John de Crèvecoeur, who visited the area about 1789. Writing about Popolopen Creek, he says: "It is only after having put in motion the hammers of two big forges and the bellows of two furnaces, known under the same name, that this little river joins its waters with those of the Hudson. . . ."[1] Unfortunately Crèvecoeur has proven to be somewhat unreliable, drawing upon his imagination now and then.

A gap occurs in Queensboro's recorded history from 1789 until Christmas Day 1799, when an advertisement appeared in the *New York Spectator*. Here is the first contemporary description of the Queensboro ironworks to be found in print that gives an overall picture of the properties:

> Queensboro' Iron Works For Sale
> . . . consisting as follows:
>
> The Queensboro Tract, containing 1,437 acres of good meadow, pasture and woodland. The one undivided moiety of the forest of Dean Tract, consisting in the whole of 8,600 acres of land as above.
>
> The Bearhill Tract, containing 800 acres, mostly wood-land, and some meadow ground: And
>
> One undivided share of another tract of land called the Staat's patent, containing 400 acres of tillable and woodland.

After giving the location in relation to New York, the advertisement points out that these properties can be purchased either as a unit or in two separate parcels. The Queensboro and Forest of Dean tracts are joined to form one parcel and the Bearhill tract and Staat's patent combined to form the other group. Interestingly, the Queensboro and Forest of Dean were under the same ownership. Also at this time, iron was being made at Queensboro furnace but not at the Forest of Dean which was in ruins. The Forest of Dean mine was still being worked and supplied the Queensboro furnace with ore.

> The two first tracts, the Queensboro' and the forest of Dean, on which are erected the Iron-works, consisting of a furnace and forge, with two fires, both in compleat repairs, and provided with all the buildings necessary for carrying on the said Manufactory, viz. coal houses, carpenter and blacksmith shops, a convenient two story house for a manager, built last summer, and a number of other frame and log houses, with gardens, for the accommodation of the workmen—there is besides, a saw mill erected near the furnace, which supplies the establishment, and the market, with a considerable quantity of lumber; and a farm improved on the Queensboro' tract, equal for grazing to any in this state, with all necessary out houses . . . the quality of the metal is perfect—the agents for government, the states of New-York and Connecticut have drawn considerable supplies of ammunition from the Queensboro' furnace to their avowed satisfaction—the short distance of 2½ miles from the works to the landing is a considerable advantage, and the average benefits of the said works can be demonstrated to any person desirous of purchasing.

Further description surprisingly reveals that one of the earliest nail manufactories in the nation was located at the Bearhill tract, a discovery previously overlooked by historians:

> The other two tracts, the Bear-Hill and Staat's patent, tho' bounded on the two former ones, may be considered as a distinct establishment and purchased separately, they run 2½ miles along side of the river and comprehend a commodious creek [Popolopen], navigable for vessels of 50 tons—here are erected on the said creek, three docks, three dwelling houses and a store, a grist mill, a saw mill and a slitting mill, wherein a nail manufact[illegible]has lately been established . . .

Following a description of an elegant two-story house just erected at the spot where Fort Clinton formerly stood, on the south side of Popolopen Creek, and the plentiful fish pond (Hessian Lake) near, the buyers are promised indisputable titles to the properties and are directed for further particulars to either E. Luget, on the premises, or C. Lagarenne, 6 Duane Street, New York.

When it was decided to put the Queensboro furnace out of blast in 1800, some of the workmen, learning of this decision, left before the actual shutdown to seek new jobs.

Ten years later, on December 1, 1810, the property was again put up for sale at public auction. This time the notice appeared in the *New York Evening Post* of September 14, 1810. The Queensboro tract was still, as in the 1799 sale, just one of four properties and is described as:

> all that certain tract of land known by the name of Queensborough, lying being near the Dunderberg Hill, and situate on and near a certain Brook called by the Indian, Sickoftenskall, and by the Christians, Stony Brook, which Brook runs into the Poplopes kill, containing 1437 acres of land. . . . [A description which followed indicates that changes had taken place in the ten year interval] On the premises are . . . two large forges for making bar iron, each forge having two fires—one of them is not yet quite finished, but the one that is completed, has made, with one fire only, two tons of iron in a week. One of the forges is about 300 yards from an inexhaustible iron ore mine, the other about two and a half miles from it, approaching the North River, the mine is about five miles from the river, its ore is of excellent quality, very abundant, and so rich as to furnish a ton of bar iron from two and a half tons of ore.

The mine "about five miles from the river" no doubt was the Forest of Dean mine. Note is made that more ore can be mined than will be needed to supply the two forges, estimating that 2,000 tons could be sold annually.

Mention is also made of a mine within the "Queensborough" tract, whose ore, when mixed with Forest of Dean ore, makes excellent castings. Only one reference is made to the Queensboro furnace, which had been out of blast for ten years. "There is the stock of a furnace at a short distance from the lower forge, which could at a small expense, be put in good o[illegible]" Nor were the

mines, furnaces, and forges the only useful and profitable attractions at this Popolopen Creek site.

> A new grist mill on Polopes Kill, near the North River, dimensions 65 by 45 feet, having four pair of best burr stones of five feet and is believed to be capable of manufacturing 20,000 barrels of flour in a year. Boats of upwards of 50 tons may load and unload along side of the mill. There is a two story dwelling house near the mill, with a small dwelling house and a cooper's dwelling house and a cooper's shop, 60 feet by 20, conveniently situated.
>
> Also, on the same stream, an old Grist Mill with two pair of stones; the frame and boarding of this mill are sound. . . . Near the mills, on the same stream, is a new saw mill with two saws, capable of cutting into boards 1000 logs the season—the mill is provided with machinery to draw the logs into it from the water—farther distant in the woods is another saw mill, with one saw, situated among fine timber.

The sale of these properties held "in pursuance of an order of the Court of Chancery" (Samuel Corp, John F. Ellis and Gabriel Shaw, versus Alexander Macomb and others) was signed by Thomas Cooper, Master in Chancery, May 16, 1810.

Professor Beck visited the area in August of 1838 and noted that George Ferris owned a forge at Queensboro, as well as the Forest of Dean mine at that time.

The forges on this property were worked for a number of years, one of them still being active as late as 1843. The furnace, however, was never used again. In 1885, a writer named Kirk Munroe, visiting the Queensboro furnace ruins, described them as one of the most picturesque to be seen in the country:

> It stands in an open field by the roadside and is about thirty feet high, its grey walls are mantled with ivy and from its crumbling crest springs a clump of good sized trees. Its arched entrance and interior dome are clean-cut and unbroken as when the builders left them and are beautiful specimens of the stone-mason's art. It is known as the old furnace "par excellence," and is said to have been erected under the personal supervision of Kosciusko, the gallant Pole.[2]

The furnace was restored at federal government expense in 1912 and is once again in good condition. The most unusual and significant feature is its unusually high, sharp-pointed archway on the south side. The property on which it stands was acquired by the United States Military Academy in 1942 and is not open to the public. W. A. Rigby, who had been superintendent at the Forest of Dean mine, believed the old furnace capable of producing about one ton a day and he thought that it probably required a number of men to operate it. From the many pieces of slag found around the furnace, he surmised that it must have been difficult to keep the furnace operating smoothly. Remains of old charcoal beds

Queensboro Furnace. *Outing and the Wheelman*, Dec. 1884.

can be found in the surrounding woods, and the hillside back of the furnace is covered with charcoal debris, according to Rigby.[8]

Unique Popolopen Creek with its natural beauty and the historic interest of the ironworks is well worth visiting today. Thousands of mammoth boulders from the Glacial Age lie around the area as if tossed by a giant attempting to block the flow of the stream to the Hudson. Walking in this area, particularly along the north bank of the creek from the furnace site to the river is rough but rewarding because of the magnificent views of the rugged surroundings.

Nearly three-quarters of a mile downstream from the old stack on the north bank of the creek is the site of one of the forges. In 1958, a broken iron pig was found almost totally buried at the water's edge, with the letters "SBORO" on it. The portion marked QUEEN was missing, however. This fragment is important, as proof that the name was spelled "Queensboro" rather than "Queensborough" as it often appears on today's maps. The old foundations of the forge can be seen still. Years ago according to King Weyant, former caretaker for the Queensboro property, who remembers those days vividly, a scrap dealer collected the loose iron, but fortunately he missed this shattered piece which is now a treasured possession of the author.

There are many other traces of Queensboro's history still visible: the outline of an old road that dipped down near the creek and then crossed it; the ruins of an old mill with its raceway running through an overhead flume along a hillside to the mill wheel as shown in a nineteenth century Currier & Ives print; and the scattered rubble marking positions of other buildings which once were used to house men and equipment. All is now reverting to that natural state in which those pioneer ironmasters must have found it when they started to create the once thriving hamlet of Queensboro.

RAMAPO WORKS

In the spring of 1795, Josiah G. Pierson, owner of a nail factory in New York City, came to the Ramapo Mountains.[1] About a year before, he had received a patent for cut nail machinery and he

was looking for a favorable site on the Ramapo River where he could build a rolling and slitting mill, as well as a nail manufactory. As the nearest rolling mill was in Wilmington, Delaware, he decided to build one nearer where the iron could be rolled into sheets of the proper shape. Impressed by the advantages offered he promptly purchased 119 acres of land from John Suffern in what is today called Ramapo.

Construction got underway in the latter part of May, 1795, after the first tools and supplies were sent from New York. That October, Josiah and his brother Jeremiah gave the new place the unimaginative name of "Ramapo Works." They built a 120-foot dam followed by sluiceways, a blacksmith shop, and a rolling and slitting mill. A group of buildings for cutting and heading nails all under one roof, measuring approximately 100 feet by 150 feet, was also put up.

Jeremiah Pierson moved to Ramapo June 1, 1796 to supervise construction while his brother remained in the city to handle business matters including the shipping of necessary supplies to the new works. Manufacturing operations were started in the spring of 1797. When Josiah died in December, his brother Isaac took over management of the firm's New York interests. The original name of the firm, Josiah G. Pierson & Bros., was retained until 1807.

In the spring of 1798 the 65 hammer and nail cutting machines used in the New York factory, were shipped to the new works together with 31 heading machines. By July all manufacturing operations, including nail cutting, were under way at Ramapo.

The demand for nails and hoops used to make sugar barrels for the West Indies trade was so great that the Piersons found a brisk business right from the start. A community store was also built in 1803. It became a shipping station after the coming of the railroad. By 1806 the demand for nails and hoops was still so great that 142 men were employed and the Ramapo works had added a forge, sawmill, and gristmill to the buildings previously constructed. A post office called "Ramapo Works" was established the following year which supplanted an earlier one just a mile or so south in New Antrim (Suffern). In 1809 Jeremiah Pierson, writing to a correspondent, described the various types and amounts of iron used at Ramapo and the proportion which was native ore. "Of the iron used here three-fourths is Russian and one-quarter is made in

PART IV. PROJECT INFORMATION

This documentation is part of a multi-year project sponsored by the National Park Service and the United States Military Academy, explained in the United States Military Academy, HABS No. NY-5708, Volume 1, "Methodology," This written documentation was prepared by Travis C. McDonald, Jr., architectural historian, in 1982-1985 based on fieldwork conducted in 1982.